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NOVEMBER 1948

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T. D. HOGAN, VK3HX, Telephone: UM 1732.

MANAGING EDITOR:

TECHNICAL EDITOR

J. C. DUNCAN, VK3VZ.

ASSISTANT TECHNICAL EDITOR:

COMPILATION:

R. W. HIGGINBOTHAM, VK3RN.
CIRCULATION:

J. F. IRVINE, VK3TU.

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In Search of a Keyed V.F.O. Contest News—VK2 Wins Remembrance Day Contest Federal, QSL and Divisional Notes AMATEUR RADIO

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EDITORIAL

COMMERCIAL STATION OPERATION IN AMATEUR BANDS

The operation of commercial stations in Amateur Bands has always been a nuisance, and the increasing numbers of such interlopers is giving all active amateurs much food for thought.

Much has been written about our narrow bands and when it is considered that thousands of low powered signals are operating therein, it becomes of increasing importance to eliminate such high powered emissions by taking action to have them transferred to their correct allocation.

Unfortunately it is not easy to refer such information to the appropriate authorities without a certain amount of data giving call signs, date, time frequency, etc., to enable them to pass suitable details to the overseas authority concerned with such matters.

It is therefore desired that all commercial stations operating in amateur bands to gaged and the information of such emissions be passed to Federal Councillors in each Division who will forward the data to the Federal Executive for appropriate action with the Postmaster General's Department.

PORTABLE EQUIPMENT

Most Amateurs have enjoyed the experience of operating equipment under field conditions, either on field days or with portable equipment normally operated in cars or boats.

With the arrival of the summer season it is opportune to remind members who have not already done so, that they should seriously consider the design and construction of low powered portable equipment which can be operated from vibrator or genemotor supplies.

Those experimenters with service experience who remember the occasions when they were responsible for the erection and operation of such equipment, will agree that no more enjoyable experimentation can be obtained than to operate your rig under such conditions.

Apart from the opportunity for enjoyment thus obtained, there is real satisfaction in owning portable equipment which may be used for a national energency service at short notice, as has been the case with those anateurs who interest themmander of the control of the by assisting various country fire by assisting various country fire brigades.

Many interesting technical problems, from power supplies to aerials, can be tackled in this type of work whilst the technical skill required to design really compact and light weight equipment offers scope for those who take pleasure in constructive work requiring original thought.

Federal Executive.

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Ionospheric Predictions for the Amateur Bands

BY A. L. GREEN*, D.Sc., Fel.I.R.E.

INTRODUCTION As announced in previous issue Commonwealth of this magazine, the Observatory has agreed to supply spec-ial ionospheric forecasts to the Wireless Institute of Australia for a trial period of six months. During that period it is hoped that Amateurs will carefully examine the forecasts in the light of their own practical experience of longdistance communication

Two objects will thereby be achieved. Firstly it is to be expected that actual experience with the Amateur band forecasts will provide practical data on the reliability of the predictions. When discrepancies occur between forecasts and experience, as no doubt they will, careful examination of the data should lead to an improvement in the forecast-ing procedure. Secondly, if the forecasts prove to be of value in facilitating Amateur contacts between Australia and other countries, the Wireless Institute will have made an important conribution to one of the fundamental objects of Amateur Radio.

ures 1 and 2 in-PROCEDURE dicate the general basis for the Amateur band forecasts. The world includes seven principal zones, from the point of view of the

The maps in Fig-

FORECASTING

* Officer-in-Charge, Ionospheric Predictions Service of the Commonwealth Observatory, Department of the Interior

Australian Amateur, and it is desired to give ionospheric predictions of the times of the day when two-way communication within the Amateur bands will be possible, both from the Eastern and the Western States. In order to reduce the whole forecasting procedure to manageable dimensions it has been found to be necessary to select repre-sentative terminals in Australia and in the world zones as follows:-

London

San Francisco

Johannesburg

New York

Barbados

Manila

Cairo

Zone Region Western Europe

Mediterranean N.-West America

3a N.-East America

South Africa

Central America

6 Far East The above terminals are those used in the accompanying charts for the forecasts applicable to Canberra. For ex-

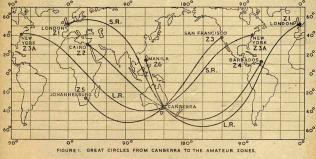
generally to Amateur contacts between the South-Eastern Australian States and China, Japan and the Philippines, The actual forecast is made for a specific circuit between Canberra and Similarly the chart labelled C-Z3A-S.R. is for the Short Route between Can-berra and New York over the Pacific Ocean, whereas the chart C-Z3A-LR. is for the corresponding Long Route over Africa.

During the trial period of these forecasts it will not be feasible to give a complete service for Amateurs in Western Australia. Zone 2 (Mediterranean)

has been omitted on the assumption that the shorter distance from Perth, as compared with the distance from Canberra, renders this forecast unnecessary. The chart labelled P-Z1 should give reasonable results for both Western Europe and the Mediterranean countries. Zone 4 (Central America) has been omitted from the Perth predictions for the reason that the Perth-Barbados great circle travels through the northern auroral zone in which ionospheric disturbances are liable to introduce uncertainty into the forecasts. Somewhat similar conditions exist on the Perth-New York circuit (P-Z3A) and it is hoped that Amateur experience with these contacts will provide valuable data on ionospheric conditions in high northern latitudes. Another difference between the Perth and the Canberra forecasts is that chart P-Z6 is for the Perth-Shanghai circuit as compared with Canberra-Manila for C-Z6.

USE OF THE Each chart is in the form of a graph with CHARTS ordinates marked in megacycles per second (7, 14, 21 and 28 Mc.) and abscissae in hours at Greenwich Mean Time. The curve labelled M.U.F. indicates the maximum usuable frequency for communication between the selected terminals. Similarly the curve (usually in two portions) marked L.U.F. is for the lowest useful high frequency over the same path. If all frequencies were available to the Am-

ateur the operating procedure would



merely be to select a frequency between the M.U.F. and the L.U.F. at the desired

time of day Due, however, to the fact that the moment, at approximately 7, 14 and 28 Mc., the procedure to be followed by the Amateur must be more specific. Considering, by way of example, the possibility of making a contact between Melbourne and Montreal, one turns to the charts labelled C-Z3A-S.R. and C-Z3A-L.R. (Canberra-New York) as being the nearest available to the desired circuit. The charts indicate that the 28 Mc. band should be open on short route for a few hours before midnight G.M.T., but closed throughout the day on long route. The 14 Mc. band should be available on short route for the greater part of the day with the exception of the period around midnight G.M.T., when the L.U.F. curve approaches closely to 14 Mc. and again in the forenoon G.M.T. when the M.U.F., curve dips towards 14 Mc. The first of these two exceptions may, however, be removed by long-route operation in the 14 Mc. band which should be possible for a while before midnight

Lastly it is important not to overlook the possibility of the 7 Mc. band in the forenoon G.M.T. Use of this band will, of course, depend on freedom from thunderstorms but it should provide about three hours of reliable commun-

ication from Melbourne to Montreal on many days in the month.

man divers an analysis of the contact desired between Kalgorile and Hong Kong. The nearest equivalent is chart P-26 (Perh-Shanghal) which in-hand should be open for at least ten bours following midnight G-M.T. The 14 Mc. band might be available for the conditions for a few hours after midnight G-M.T. the ten bours following midnight G-M.T. the 14 Mc. band might be available for the first conditions for a few hours after midnight G-M.T. due to the proximity of the LUF. curve to the 14 Mc. band tacts for nearly ten hours of the day after noon G-M.T.

RELIABILITY OF It is emphasised that ionospheric predictions for the Amateur bands relate only to the average conditions to be expected durations.

ing the month. It is not feasible, in the present state of the forecasting art, to predict conditions with great accuracy for any specified day. It is known that the M.U.F. undergoes variations from day to day and it is also a matter of practical experience that ionospheric storms occasionally disrupt high frequency communication. Another wellknown effect is the occurrence of abnormal or sporadic ionisation in the E region of the ionosphere. Generally speaking this phenomenon is welcomed by the Amateurs, particularly those operating in the 50 Mc. band, but it is not an easy matter to include any sporadic effect in a forecast of average conditions.

In addition to these day-to-day variations in the ionosphere, there are two

systematic sources of error in ionopheric predictions. Firstly the general special properties of the special properties of in sympathy with the smoothed value of the monthly sumport number. It is obvious, therefore, that an error in the month will produce an error in the general level of the M.U.F. curve. Durnumber has been considerably greater than the predicted value, as forecast than the predicted value, as forecast that the communication has sometimes been possible at frequencies greater than the prediction of the maximum usable

Secondly the value of the M.U.F. for long-distance communication depends on the actual height of the ionosphere. Unfortunately it is not possible, so far as in now known, to make experimental measurements of true heights of reflection since all known methods of ionospheric sounding are found to measure virtual heights, i.e. the height that a wave would reach if it travelled exactly with the velocity of light throughout its path. The practical effect of this discrepancy between actual and virtual heights, as it affects ionospheric pre-dictions, is that the predicted M.U.F. curve may be too low during the dawn period. By way of example, the trough in the M.U.F. curve on chart C-Z3A-S.R occurring at about noon G.M.T. cor-responds with sunrise at New York. During this period it may sometimes be possible to maintain communication with Australia in the 14 Mc. band in spite of the M.U.F. curve dipping below this frequency.

FORECASTING It does not seem mETHODS to be necessary to give details in the present article of the fundamental methods of ionospheric forecasting. Complete descriptions have recently been given (see bibliography) of the methods do expend during the last war

ards and by the U.K. Department of Scientific and Industrial Research. The idea lying behind the prediction of the L.U.F. is, however, of recent origin and merits a brief description.

Remembering that we are concerned here only with average conditions, and that sporadic effects are not included. the broad picture of long-distance radio communication is based on the idea that a satisfactory circuit can be maintained only via the F region of the ionosphere at a height of about 300 km. above the earth's surface. It is known that the reflection coefficient of the E region. at a height of about 100 km., is much less than that of the F region, the difference being due to the fact that the density of the atmosphere decreases as the height increases. Consequently it is the aim in long-distance communication to select a frequency for the transmissions which will enable the signals to penetrate the E region but be reflected by the F region. From this point of view the M.U.F. curve on an Amateur band chart gives the penetration fre-quency of the F region whereas the L.U.F. curve correspondingly indicates the penetration frequency of the E region. It immediately follows that signals at a frequency lying between the two curves will penetrate the E region, as is desired, and will be satisfactorily reflected at the F region.

This is the control to the control to the comment and come considered of the mechanism of multi-hop propagation between the innosphere and the earth's surface. Considering firstly a ray the control to the carbination of the control to the carbination of the control to the carbination of the carbin



require at least four of such 4,000 km. hops if the transmitted frequency is close to the maximum. In other words the distance of 4,000 km. is the skip distance for a signal transmitted at the maximum usable frequency. Signals at higher frequencies will penetrate the frequencies lower than the M.L.F. may travel by hops smaller than the maximum distance of 4,000 km.

imum distance of 4,000 km.

We must also consider similar that we must also consider similar that we may be a similar to the small angle of elevation, say up to 10 degrees above the horizontal. A ray at this angle of elevation will attain a state of the small similar than the small similar than the small similar of 500 km. from the transmitter and, if it can penetrate the Ergion, it will eventually rise to the Freign, it will eventually rise to the Freign, it will eventually rise to the Freign, it will state by 2,500 km. hope between the earth wand the Freign. If it is held to the earth at a distance of only 1,000 to the earth at a distance of only 1,000 to the earth at a distance of only 1,000

km, from the transmitter It is clear, therefore, that E region reflections suffer from two disadvantages. Firstly the E region is relatively a poor reflector in its normal state of ionisation. Secondly E region hops are much shorter than those via the region, with the result that long distances (above 10,000 km.) involve large number of successive reflections between E region and earth, and signal intensity is lost at each point of reflec-Consequently the L.U.F. curve on the Amateur band charts indicates the frequency at which the useful signals, up to an angle of elevation of about 10 degrees, are held down by the E region and thereby become too weak for long-distance communication

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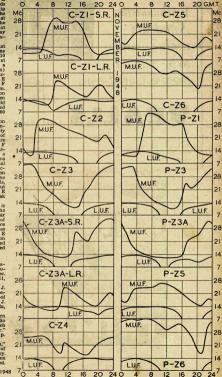
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ENQUIRE FROM YOUR NEAREST DEALER

Making a Simple Narrow Band F.M. Adaptor

BY C. H. CASTLE*. VK5KL

With the increasing use of n.b.f.m. on 28 Mc. by American phone stations, it is in keeping with the times to be able to give the other fellow a good report on his signal, instead of just detuning your receiver slightly until his speech is reasonably intelligible, and letting it

The advantages of his using n.b.f.m. are lost by your reception on a a.m. receiver. To take advantage of the opportunity offered, and to gain experience of n.b.f.m. a simple adaptor was constructed, and is being used in conjunction with the receiver at the writer's station.

CIRCUIT

Reference to Fig. 1 will show the simplicity of the Adaptor.

The limiter stage con-sists of a 6SJ7 sharp cutoff tube operating with very low plate and screen voltages, and without fix-ed bias. This is done so that the stage will be easily overloaded by the incoming signal, thereby removing the amplitude modulated components from the carrier. limiter is coupled to the 2nd i.f. stage with a 5 coupling condenser and the grid is returned to ground through the 1 meg. resistor.

Note that the cathode goes direct to earth. The plate and screen-grid replate and screen-grid re-ceive their h.t. through the voltage divider R2, R3, R4. Due to the high value of R4 (0.25 meg.) and the low values of R2

and R3 (each 30,000), the voltage applied to the plate and screen of the limiter will be very low, therefore cor-

rect limiting will be obtained Do not use this circuit without R4, otherwise limiting will not be correct, apart from the quick demise of the limiter due to excessive plate current The discriminator is coupled to the

limiter through the discriminator transformer described later. This transformer has two secondary windings, one tuned above and one below the centre carrier frequency.

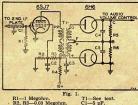
With no modulation on an f.m. carrier the rectified r.f. across the load resistors R5 and R6 cancel. As the incoming carrier is frequency modulated, the voltages appearing across R5 and R6 become addative and an audio voltage will appear between A and C

MAKING THE DISCRIMINATOR TRANSFORMER

The only snag was the discriminator transformer but this was overcome after several attempts, and the following procedure was found to work satisfactorily.

* c/o. Dept. of Civil Aviation, Darwin.

As can be seen from the circuit diagram, the transformer is for 455 Kc. and uses a double section primary and secondary winding. This was constructed out of two iron-cored 455 Kc. i.f. transformers. Take one and carefully remove the wax on the former between windings and after softening the former and coil at the top with a lighted match, push the coil down until it is alongside the other at the bottom of the former. Next remove the fitting that holds the iron slug from the top of the former. Remove both coils from the other transformer, and place on the first former at the top, as in Fig. 2, and replace the slug fitting. Care should be taken to



R2, R3-0.03 Megohm.

C2, C3-0.1 uF. C4, C5-100 pF. R4-0.25 Megohm. R5, R6-0.1 Megohm. see that the coils are replaced as taken off so as not to reverse the windings.

> The coils are now connected as in Fig. 2, and two leads attached for the primary connections. The windings can now be rewaxed.

> Wiring of the adaptor can now proceed, and when completed, connected to receiver either by temporary shielded leads to i.f. plate and to audio, or the necessary leads taken to a socket on the back of the receiver and the adaptor plugged into that. A toggle switch is necessary to switch the audio from a.m. output to adaptor for n.b.f.m.

ALIGNING THE ADAPTOR

Using a signal generator the first step is to re-align the i.f. stage to 455 Kc. as the loading of the adaptor will have put it off tune. Switching the audio to n.b.f.m., and using a high resistance voltmeter (20,000 ohms per volt), connect it across the first output load resistor from A to B (Fig. 1) noting if the polarity is correct.

Detune the signal generator 10 Kc. to either 465 or 445 Kc. and tune the transformer slug (underneath one) to maximum reading on the voltmeter. Connect meter from A to C, now reversing polarity. Retune signal gen-erator to 455 Kc., and tune the top slug for zero volts. The adaptor is now ready for test.

TESTING THE ADAPTOR

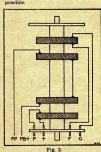
With no signal input to the receiver switching to n.b.f.m. the noise level and output increases considerably. When a signal is tuned in the noise level drops. This shows that the adaptor is working OK.

Receiving a.m., tune in an a.m. signal and switch to n.b.f.m., the a.m. signal appears to lose its modulation and should be distorted, but can be received OK by tuning to either side of the carrier. Tests show here that receiving a n.b.f.m. station on a.m. the speech is hard to follow but becomes 100% on switching to n.b.f.m. reception.

NOTE.-When using the adaptor the a.v.c. switch on the receiver is switched off. Although this puts on the b.f.o. in some receivers, it is not audible as the 2nd detector portion of the set is not in use at the time.

CONCLUSION

No technicalities will be gone into here as reception differs with strength of signal and deviation ratios used in or signar and deviation ratios used in transmission and is treated in most text books. It is interesting to see the theory work out and at the same time bring your station in line with modern practice.



A Simple Low-Cost Hydraulic Beam Rotator

BY L. P. MONCUR*, VK3LN

Confronted with the problem of placing a rotary beam at the top of a 105 foot mast, with a major requirement of a lightweight motor which could be pulled up on the halyard, this pydraulic rotator proved the answer, as the total weight of the \$5 element series-phased co-ox feed line is under 10 lbs, and is not nearly the potential danger at the top of the pole as a 50 lb. prop. motor.

The idea has seven major advantages:

1. Extremely light in weight.

- Absolutely silent in the receiver.
 Any extreme of speed can be accomplished with the turn of the
- 4. Can be mounted at any distance from the shack.5. "Nylex" water line can be run
- underground to the antenna pole.

 6. As the rotator cannot make more than one revolution, the feed line can be connected directly to the beam, without slip rings or in-

7! Perhaps the main one—you stand an excellent chance of getting some change from the pound spent on the gear.

ductive loops.

CONSTRUCTION

The rotator is constructed from an old hand motor-pump, which can usually be had for the taking away, from the junk pile at the local garage.

With a back caw cut a spiral track !! wide running about 400°, in the top half of the pump, see Fig. 1. At the half of the pump, see Fig. 1. At the half of the pump, see Fig. 1. At the control of the pump that the bottom of the keepwar jee of the pump that the p

The top cap of the pump is drilled out to take a 3" water pipe. The water pipe is cut \(\frac{1}{2} \) "eater pipe. The water pipe is cut \(\frac{1}{2} \) "less than the length of the pump stem, plus a flange to take the beam, and welded where shown. A \(\frac{1}{2} \) "diameter pin, \(\frac{1}{2} \) 'on, is welded to the side of the water pipe and the whole unit described is then placed over the unit described is then placed over the unit described is then placed over the control of the property of the place of the

supply of water pump grease, and place in the barrel. Mark the barrel at the bottom of the washer when the pin is 380° away from the keyway, and around this line drill a dozen holes, 235 Union Road, Ascot Vale, W.2. Vic. 1/32" in diameter, this ensures that the line will never be required to carry more pressure than the weight of the beam itself. See that the inside of these holes are cleaned off, otherwise the leather washer will be damaged.

The water feed line is of 4 mil. clear "Nylex" sleeving, 3/16" inside diameter, the type obtainable as insulation slee ing, and its low cost (about 16/- per 50 yards) makes the whole thing worth-This feed line is connected to while. the normal air outlet of the pump, and run back to a stop tap on the water mains (Fig. 2), making sure to break down the pressure to 3/16" size with metal pipe fittings, which will withstand the water pressure. A ½" plug is fitted to the stop tap, and drilled to take two 3/16" outside diameter copper tubes, which are sweated into the plug. The other end of the copper tube, which takes the "Nylex" sleeving, is tinned with solder to make a tight fit. The remaining tube is the by-pass, controlled by a standard petrol tap. The water is then taken to the nearest drain or your favourite vegetable plot. About one cupful of water is required for each revolution of the beam, and as the

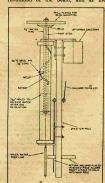
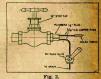


Fig. 1.

General constructional details of rotator showing mounting of pump.



Method of water outlet from water mains.

system remains full of water when not in use, this is the only water used.

The hydraulic rotator is mounted water than the hydraulic rotator is mounted as a small uptuned succepts, large sound to go over the top of the mast, and a small uptuned succepts, large sound to go over the top of the mast, and a small uptuned succepts, large and to go over the top of the mast, and a small uptuned to the mast pole and to the main pole and, thereby removing all weight from the halyard. The "U" piece fits around the main pole and is held

there by the halyard return.
There is no reason why this idea
There is no reason why this idea
General to the control of the control
Mc. beam is nothing when compared
with a line full of wet clothes, as occur
in the weight of the beam is not sufficient to ensure a water-tight pressure on
the weight of the beam is not sufficient to ensure a water-tight pressure on
worry as it only means allowing a drop
or two of water through the mains up
to compensate for it, anyway it works

SOCKET-PIN PROTECTOR

When you are stripping some of the gear and want to be able to use the parts again in another rig, damage to the fragile socket-pins can be avoided easily by plugging an old tube in the socket white you unsolder the competions. The pressure of the tube pins against the socket terminals keeps them straight, and prevents bending and lossening.

CHEAP MOUNTING FEET

A short length of 1" rubber tubing, available in almost any hardware shop, may be used to provide cheap mounting hardware control of the cont

DESIGNING A V.H.F. TRANSMITTER

BY J. N. WALKER*, G5JU

Whereas it used to be considered that special VLFs. Lechnique must be applied to frequencies above 30 Mc., it is applied to frequencies above 30 Mc., it is can be used up to a least 60 Mc. providing the valves are suitably chosen of the physical dimensions of the assembly the suitable of the properties of the physical dimensions of the assembly and the physical dimensions of the assembly and the physical dimensions of the assembly and the physical dimensions of the assembly applied to their existing transmitters with the physical distribution of the physical di

As frequencies rise into the very high region, several inter-related difficulties arise. Due to the greater relative effect of valve and other strux capacities, the low. Briving power is insufficient and loss of efficiency results. The latter means that heat dissipation inside the valve is greater than it should be and capacities are supported to the control of the Generally speaking, a larger valve than is really necessary has to be employed.

A little juggling with the circuitry will improve matters all round. Increasing the efficiency of the early stages will result in greater power output and, in cases where it has been necessary to struggle to obtain the last ounce of drive, a distinct improvement will result.

The special valves now made for VHE work can also make a considerable difference, particularly the twin able difference, particularly the twin considerable difference and the special considerable difference particular diff

In the first place, it is assumed that the various stages in the transmitter are frequency doublers and not multiplying three or more times. The usual circuit



Stray capacities and lloading represented by C2 and R2, are in parallel with the tuned circuit, which condition seldom allows the proper L/C ratio to be used. Technical Department of Eddystone Works, Stratton & Co. Ltd., Birm-

ingham, England.

Amateur Radio; November, 1948

may be as shown in Fig. 1a with capacitative coupling between stages. Alternatively, the grid circuits may be separately tuned coil condenser combinations with link coupling, Fig. 1b. In both cases, the stray capacities, represented by the strain of the



Fig. 1b.—An improvement over Fig. 1a, but the tuned circuits still have the stray capacities in parallel.

quencies, is a serious drawback. The inductance which can be used is necessarily small, the Q or coil magnification is low, as also is the dynamic resistance of the tuned circuit and, with the comparatively low input impedance of the approximation of the control of the difficult matter to induce voltage of reasonable magnitude across the circuit.

The circuits in Fig. 1 are both single-ended. By converting them to balanced or double-ended circuits, as in Fig. 2 proved. The cutput capacity of VI and the input capacity of V2 are now in series ercors the coil whilst the damping series ercors the coil whilst the damping series ercors the coil whilst the damping reduced. Consequently, the size of the cells can relatively be much larger. The coils can relatively be much larger. The the value of the tuning condensers in the value of the tuning condensers in the value of the stray capacities but a sixty to seventy-five per cent. Increase in the majority of cases.

"Tuning will be noticeably sharper and more care in adjustment of each stage will be called for. Spilt-stator tuning more care in adjustment of each stage will be called for. Spilt-stator tuning the stage of the care of th

TREBLERS valve, over-biased and driven hard, will give practically as much output on the third harmonic as on the second. Advantage

may be taken of this feature to reach the final frequency in fewer stages than would otherwise be necessary.

Would otherwise be necessary.

It has been found that the balanced circuit is not so efficient as the single ended in a stage designed to give odd harmonic multiples (e.g., the third). When tripling, therefore, the single-ended circuit should be used but with the anode (or grid) tapped down the coil about half way, to remove some of the effects of valve capacity and

loading.

Still better is a push-pull tripler stage, which will give greater efficiency and output. The twin tetrode—in particular the 852—lends stell well to the purpose of the stage of

PRACTICAL In the first place, the care must decide reader must decide the fundamental frequency—which, it is assumed, will usually be a crystal, and the sequence of following stages, which may be doublers, treblers or a combination of both. In order to save a valve, the



Fig. 2.—Balanced circuit, with the stray capacities effectively in series. Much greater coil sizes can be used.

first stage should be a tritet, with the output on either the second or third harmonic. From then on, balanced circuits with capacitative coupling will prove both simple and efficient.

A number of split-stator condensers will be required and the sizes of the coils will. probably call for some experimental work. The L/C ratio of each tuned circuit, for efficient operation, should be kept as high as possible, hence small condensers, such as the Eddystone Cat. No. 583 or 584, are quite suitable.

The final frequency multiplying stage should be link-coupled to the tuned grid circuit of the power amplifier, which, it is assumed, will be either an experience of the power of the power

(Continued on Page 11)

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L		6H6		EF50	7/6	VR66	7/6	1	
Ā		3824	10/-	VR91	7/6	VU139	7/6	c	
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DESIGNING A V.H.F.

(Continued from Page 9)

For those who like to work to a definite circuit, Fig. 3 is provided and details are given of component values. The circuit is suitable for CW or telephony operation—with the latter, the usual method of simultaneous anode and screen modulation of the final valve should be employed.

Several modes of operation are possible, the following being examples:—

6V6 1st half 2nd half Final

Crystal Anode 832 832 Output 6.25 Mc. 12.5 Mc. 25 Mc. 6.05 Mc. 6.05 Mc. 60 Mc.

In the latter case, the final valve in Fig. 3 would be used as a power trebler, although it would be better practice to add a further double tetrode as a straight-forward power amplifier.

If a VFO is substituted for the crystal oscillator, it should be arranged to give an output over the frequency range 3 to 3.75 Mc., the 6V6 in Fig. 3 then acting as a frequency doubler. In this case, the tuned circuit in the cathode of the 6V6 will of course be omitted. By simply changing the final anode coil, it will then be possible to cover both bands—60 and 144 Mc.

Experiments have been carried out on the final anode circuit on frequencies in the region of 50 Mc. and 144 Mc. In neither case was any real benefit obtained by the use of linear tank circuits, using copper tubes, etc., provided the smallest possible amount of tuning capacity was used at C in Fig. 3. It is surprising how large a coil is required with double tetrode valves—up to 6 turns of 2" diameter on 50 Mc, and 3 turns 11" diameter on 14 Mc.

More attention than usual should be paid to by-passing and to reduce the inductance and impedance of wires carrying RF currents, copper strip 2" wide should be used instead of wire. Such strip, if not readily obtainable, can be cut from a sheet of foil.

Further, the usual precautions of keeping all leads very short, and of using one common earthing point per stage, should be observed.

AFILIAL Co-axial feeder or ball-COUPLING ancel line is obviously the best method, at these frequencies, of transferring the coupling loop, with ceramic bead incoupling loop, with ceramic bead insulation, arranged at the centre of the tank coil, and taken to a suitable plag and the centre of the same of the coupling loop, with the coupling loop of the coupling of the coupling of the coupling loop of the coupling of the coupling loop of the co

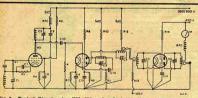


Fig. 3.—Typical Circuit using 6V6, 832 and a final 832, 815 or 829B. The output frequency can be arranged for 50, 60 or 144 Mc. Two 6V6s can be substituted for the first 832.

C1—160 pF, variable,
C2—60 pF, variable,
C3—25 x 25 pF, variable,
C4, C5, C6—15 x 15 pF, variable,
C7, C8, C9—0.02 uF,
C10, C13—50 pF,
C11, C12, C14—500 pF,
R1—100,000 ohms, 1 watt.
R2—200 ohms.

R6, R11—47,000 ohms, 1 watt. R7—250 ohms, 3 watts. R8—5,000 ohms, 3 watts. R9—15,000 ohms, 3 watts. R10, R12—470 ohms, 1 watt. R13—1,000 ohms, 1 watt. R14—7,500 ohms, 5 watts. M—100 Ma Meter

R4-33,000 ohms, 1 watt.

R5-20,000 ohms, 1 watt,

AN IDEA

If you have a crystal holder with flat plates and both your crystal frequencies are jammed—try putting the two crystals in the holder together—you'll often get a new useful frequency in the band. I've seen it work.—VkfRX.

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TIME MARCHES BACKWARDS

BY WARWICK W. PARSONS* VK5PS

Just recently I was fortunate to come upon a copy of the one-time official organ of the W.I.A. (S.A. Division), to wit. "The South Australian Wireless and Radio." The copy was dated ist Octo-ber, 1924, and the feeling of nostalgia which crept over me as I perused the pages prompted the thought that some of the paragraphs might prove enter-taining to others.

Page one had in bold type "Will It Last? Is it (radio) just another craze that will pass?" The editor has no doubts about it, because he says in reply "That radio will last is as certain as the sun shines. It will do more than With improvements being reported every day, radio will perform such a public service that it will become one of the necessities of everyday life. (How true these words have been borne out would probably astonish even such an optimistic gentleman as the editor appeared to be.)

Our old friend static was in evidence on page two because 5BG (Harry Kauner) is reported as saying "Loop perial sets will be necessary to pick up long distance stuff now that summer has set in." He also naively remarks, "It is no good cursing the local broadcasters for broad tuning if you are using a single circuit in your receiver." In fact he doubts if a double circuit would do much good either. (I seem to have heard that one lately too.)

Page five throws a spanner in the works: "The boom begins, Amateurs anxious about transmission rights . Radio is moving fast, on all sides enquiries are coming in from Amateurs concerning the right to transmit . . . Among the old hands who listened in with experimental licences are many who have a keen desire to transmit . . As a matter of fact, queer call signs are frequently picked up which suggest that experimenters are already on the job. (Naughty boys.) The licence fee to transmit is given as five shillings per annum, and most Hams thought this a bit tough." (I wonder what they would think now?)

The sixth annual general meeting was held on 3rd September at the University of Adelaide, and a full report appeared on page seven. The President, Mr. R. B. Caldwell stated, "Regulations in the past have not been very liberal as far as the Radio Amateur is concerned, and I can quite imagine the Amateur of the future being asked to pass a highly technical examination, do a test of 30 or 40 words per minute in morse code, and then being licenced with a maximum power of five watts to transmit on

* Divisional Sub-Editor, 483 Esplanade, Henley Beach, S.A.

the air between 2 a.m. and 4 a.m. by special permission of a J.P. (You beaut.) He also was slightly off the target with "Regarding broadcasting as at present defined, I am inclined to the feeling that it is not going to be the success, nor the revenue producing concern that some people anticipate." However he was credited with a bullseve when he said. "The future of the Amateur will depend

in a large measure upon union among themselves, and it behoves us to court all wireless clubs to affiliate with the Institute, so that a united front may be presented should the rights of the Amateur be assailed." (Words just as applicable then as now)

A list of Amateurs in VK5 was on page nine and several stalwarts were listed even then, 5AC (Roy Cook), 5AH (Freddy Williamson), 5BF (Frank Miller), 5DA (Roy Buckerfield), 5BN (Hall Austin), also a guarded mention of a "pirate" being heard often. (Probably 5JS or 5LW!!)

. On page ten is a letter of thanks from a reader to 2FC for shutting down between 9 p.m. to 10 p.m. to permit listeners to try and tune in to KGO. It save "A fine gesture 2FC." (Couldn't you see a broadcasting station doing that these days?) Page 10a states, "You cannot beat a crystal set for good reception. Four pounds for a set with headphones and a Government licence will give you the most fascinating entertainment imaginble."

Page eleven reports, "In opposition to the time signals, a new spark station has come to light with genuine doots and darshes at any old time between 9.35 and 9.45 p.m." (Bring me the absorption meter Jeeves!) Also on this page was "Removing the slider contact on his receiver, an Amateur at Wallaroo overheard two ladies talking on the telephone." A telegraph messenger at Berri "picked up California on his home-made set and became so excited that he dropped the receiver and hopped off to see a friend." (Must have dropped the receiver on one of his big toes.) Page fifteen carries details of a meet-

ing of the West Suburban Radio Club and several members' names bear a familiar ring. The Quorn Radio Society also held its first meeting amid great enthusiasm. The Subiaco Radio Club also held a special demonstration illustrated by lantern slides. On page eighteen I notice that a Mr I. Deane (Tusmore Park) asks how many turns he will require to receive Sydney and Melbourne. He is using a dull emitter valve. (You little devil Launce, playing around with a dull emitter valve, it might have gone off Pop. Pop.) Page twenty lists Interstate Hams who are putting in good signals into VK5. The following get the palm:—2RJ, 2HM, 2GQ, 2YI, 3PR, 3EF, 3RY, 3BU, 4AN on c.w. and a VK6 call sign unknown.

Page twenty-two headlines the fact that a young Amateur 5DA (Roy Buckerfield) had succeeded in contacting America on 90 metres, and this is claimed as an Australian record. It says, "Roy started off with a modest CQ but no reply was received, after five calls U6AKW came back." (Was the fifth CQ a very immodest one Buck?) Page twenty-four had a local "menace" who twenty-four had a local "menace" who gave a very amusing write-up on the doings of the boys, and one example is priceless, "Radio Amateur Station 5BN (who incidentally is our President to-day, 5AW), it is stated, has recovered from a burnt out transformer, and is about again. His music is very nice to listen to now, especially from the new tone arm." (Did you suffer much Hal from the burnt out tranny?)

Well fellows, there was quite a lot more in the same strain, but I think I have taken up enough of the editor's. and your time. A lot of water has flowed under the bridge since then, and we have improved in the art tremendously. OR HAVE WE? Anyhow, never let us forget the debt we owe to the pioneers of Amateur Radio, which is still the grandest hobby ever.



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Resurrecting an L.M. Type Bendix Frequency Meter

During the past two years quite a number of Bendix Frequency Meters have appeared on the disposals market. These Instruments are of two main types, BC221, which has a self contained types, BC221, which has a self contained battery supply in a compartment under the Meter, and the type LM which is much smaller and depends on an external d.c. supply for its power. In addition the LM type can be modulated from an audio oscillator contained in

Both types of Frequency Meter have a very similar system of calibration. having a reference book which gives the frequency for each reading of the dial, the accuracy of the Meter being ensued by a built in 100 Kc. oscillator which beats against the variable oscillator and provides a number of check points throughout the spectrum. The variable oscillator is made to agree with the check point in the book by varying the small corrector dial on the front panel. which is simply a small trimmer across the main tuning circuit.

The big catch is that these Frequency Meters no sooner hit the shelves when they are snapped up, and unless you happen to be on the spot you miss out, and it is for the benefit of we unfortunates that this article is written, because the only Frequency Meters which remain on the shelves are the ones which have lost their calibration

books and are therefore shunned by all. The writer came upon one Meter recently, which was in such a plight, and was purchased for a very much reduced amount, with some fear, as might be realised, that we had "bought a pup." However after some experirange of 3.2 Mc. to 4.0 Mc. was straight line, and a system of calibration was devised which enables the frequency to be read directly from the dial calibrations.

It is a well known fact that if the lumped capacity across a tuned circuit is varied, the spread of the main tuning capacity can be spread or contracted at will, which gives us a means of altering the coverage. If the lumped capacity is increased the spread of the main con-denser will be decreased, and visa versa. Therefore if we decrease the value of the lumped capacity across the tuning circuit of the Frequency Meter slightly, the main tuning condenser will contract so that 100 degrees will equal instead of 101 degrees as 50 Kc. originally.

When this is done, each degree on the dial will equal 500 cycles on 3.5 Mc. and as the error is no greater than 0.6 of a degree from 3.2 to 4.0 Mc., very accurate frequency checks are obtained, reading directly from the dial. The change necessary in the lumped capacity

* Technical Editor, 23 Parkside Avenue, Balwyn, Victoria.

BY J. C. DUNCAN*, VK3VZ

of the tuned circuit is made on the small adjusting trimmer under the dust cover,

located to the right of the corrector condenser, marked "H."

The alterations to the Frequency Meter were made as follows: It is mos essential to have an oscillator on 100 Kc. which will give check points to enable the meter to be set up. This can be made quite simply by using a ple wound 7 mH. r.f. choke, and taking the cathode tap from between the pies. A standard broadcast condenser, with a small trimmer in parallel for fine adjustment, will be necessary, and it would be as well to see that the oscillator does not suffer from hand capacity effects. broadcast receiver which has the broadcast stations marked, and also 100 Kc. points, will give a rough indica-tion of frequency, provided the stations come in on the dial calibrations. After a rough setting has been made, beat on a broadcast station on a multiple of 100 Kc, or WWV, and check on the WWV transmissions on 5, 10 and 15 Mc., at a time when audible. If the oscillator is zero beating on all these frequencies, it will be on 100 Kc. The capacity required will be 362 pF. with the 7 mH. choke (RCS type 85).

Tune the 100 Kc. signal in at 3.5 Mc. on the station receiver, and zero beat the Frequency Meter. Note the dial reading, with the corrector at centre scale, then rotate the Frequency Meter dial two revolutions, and zero beat on the next 100 Kc. point (3.6 Mc.). On the writer's Frequency Meter this was 2 divisions more than the first point noted. This indicates that the main dial is spreading slightly more than required. and the amount of fixed capacity across the tuned circuit must be reduced slightly. The dial of the Frequency Meter is retuned to 3.5 Mc., and then turned about 10 divisions lower in frequency. The trimmer under the cover marked "H" on the front panel is altered by a screwdriver to bring the 3.5 Mc. signal back to zero beat, which is in effect lowering the capacity of the trimmer by a slight amount. Again take a reading and rotate the dial two revolutions to 3.6 Mc. The zero beat on 3.6 Mc. should now be nearer to the first reading taken on 3.5 Mc.

After a few tries, a setting will be found on the trimmer where every two revolutions of the dial will equal exactly 100 Kc. Then work between 3.5 and 4.0 Mc. for 10 revolutions, which will give a more critical adjustment of the trimmer for the ends of the range required. A check each 100 Kc. between the points mentioned above will show that each 100 Kc. point occurs at the same reading on the dial, every revolutions, with an accuracy of half a division. As every division is equal to 500 cycles, this is sufficient for our purposes.

It is not advisable to feed the 100 Kc. scillator into the Frequency Meter, and listen to the beats with the headphones plugged into the meter itself, because the harmonics of the two oscillators will beat together and give a series of heterodynes which will cause confusion Far better to use a receiver and avoid this source of error. In the writer's case it was found that when 3.5 Mc. came in at 3411 divisions, the 100 Kc. points were aligned correctly, as described above. As these meters are accurately matched, it would be a good plan to set 3.5 Mc, to this reading, and the readings may be sufficiently close to use as a starting point.

The three grub screws on the dial were taken out, and the calibrated dial one of the three holes in this plate is in line with the zero mark on the dial. Three holes, of the same size must now be drilled in new positions, so that zero on the dial will come where 11 divisions came previously in my case. This is easily done by laying a steel rule across the dial face, and using the calibrations on the edge of the dial to determine the new position of the hole. The other holes are then marked 120 degrees apart with a protractor. It is essential that care and accuracy be taken in the drilling of these holes, and their marking and centre punching beforehand, to ensure that the dial will read exactly zero, with 3.5 Mc. zero beating on this

It may sound complicated but actually is quite simple provided care is taken. and every step checked before proceeding to the next one. The drum dial was then shifted so that it read 35 instead of 34 when on 3.5 Mc. This dial will then show each 50 Kc. point on the fundamental. In practice it is easier to work the frequencies from 7 Mc., as each drum dial division is then 100 Kc., and the smaller dial 1 Kc. Multiply the reading by 2 for 14 Mc., and 4 for the 28 Mc. band, and divide by two for the

A check point will be obtained at Mc. from the in-built 1,000 Kc. oscillator, when the second harmonic of the variable oscillator beats with the seventh harmonic of the crystal. The corrector dial is then adjusted to make zero beat occur at 0 degrees on the main

Power Supply.-A small power supply was built on the rear of the cabinet, and a metal cover made to enclose it, this cover being fixed with self tapping screws to the sides of the cabinet. The 12 volts a.c. was obtained by putting the 5 volt and 6.3 volt windings in series on the power transformer, and taking the filament of the 6X5GT rectifier from the 6.3 volt section of the winding only. An octal socket and plug were substituted for the 5 pin socket originally on the unit.

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Nos. 612 and 614 and a capacity per section of 25 pF. Two neutralising condensers having a variation of from 1.5 to 7 pF are integrally built-in, one at each end, and lugs are fitted for direct connection of the tank coil. The whole assem-bly is ideal for use in a medium power V.H.F. transmitter employing low capacity triodes in a symmetrical push-pull circuit.



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M

Gat. No. 614 58/3 Identical to Cat. No. 612, except that it is longer and has a capacity of 100 pF per section, making it suitable for the lower frequencies.

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OFFERS YOU ST. MOST DEPENDABLE PONENTS for FM., AM., & PULSE

BUILD YOURSELF A BRIDGE

BY STEVE GRIMSLEY*, VK3ASG

A "MUST" for the shack-here is a simple LCR bridge with a thousand uses for the Amateur and Servicemen

How many times in building up an item of gear does one pick up a comdo the job?", or "I wonder what cap-acity range this condenser covers?"
That happens to me so often, and so many parts have to be restored to the junk box unused because their values are an unknown quantity, that I decided

to make up a bridge. Remember the Wheatstone bridge cir-Basically, here is the idea. As in Fig. 1a four resistances are connected in series-parallel to a voltage source. E. and a galvanometer connected between points X and Y in the network. If-

$$\frac{R_i}{R_s} = \frac{R_s}{R_i}$$

then there will be no reading on the meter, as the voltage drop across R₁/R₂ and R₂/R₃ is identical, and consequently no potential difference will exist at points X and Y. When this condition exists, the bridge is said to be "bal-anced." Now if R_s is a variable known resistance, and calibrated, then R, can be replaced with an unknown value, and the bridge brought back into balance by adjusting Ra till there is zero reading on the meter. The value of Ra is then ascertained from the Rs calibration.



A form of bridge in which the ratio arms (R₁ and R₂) are continuously var-iable, is known as the "Slide-Wire" Bridge, and is a more convenient form of the Wheatstone Bridge for our purpose. This circuit is illustrated in Fig. 1b. The balance is achieved by solving the same equation, viz .-

$$\frac{R_{i}}{R_{o}} = \frac{R_{o}}{R_{i}}$$

However, the standard does not have to be variable, thus range selector switching is more readily possible, and the ratio arms can be made common to all

By substituting an audio tone for the voltage source, E, a pair of headphones may be used instead of a meter, for the zero or "null" indicator. As this arrange-"Starlings," 46 Warrigal Rd., Surrey Hills, E.10, Victoria. ment may be used with capacity or inductance forming the standard arm of

the bridge, we have the makings of an instrument with decided possibilities. And so to our bridge. With this bridge a good range of useful values is covered, it is extremely simple to build, it is

economical in cost (surely a redeeming feature!), and it is fairly accurate provided that reasonable care is taken in its construction.

The circuit of the bridge is shown in Fig. 2. By switching in the stand-ards indicated, the ranges of the bridge are: Resistance-10 ohms to 0.8 meg- R ohme. Capacitance-10 picofarads to 0.6 microfarads: microhenries to 30 millihenries. These ranges may vary slightly with individual instruments.

45. Fig. 2

low tolerance.

short, and furnish them with a pair of

The internal standards need not nec-

essarily be very accurate. Any parts of

reputable manufacture will do. How-

ever, the components used to calibrate

possible, of good quality and with known

is no doubt obvious to those fellows

The method of calibrating the bridge

strong crocodile clips or similar.

On range F. an external standard may be used C1-450 pF. Mica. and graph calibrated to C2—0.005 uF. Mica. extend these ranges to R1—3,000 ohms. suit individual require- R2—25,000 ohms. However, the R3-10.000 ohms, W.W. Pot. ments. ranges provided seem to R4—0.5 meg., Vol. Control. my own case at least!

L—2.5 mH. R.F. Choke.

The physical construction of 'the

X2-Test leads for unknown who (as Henson would put it) have had the perspicacity and good taste to read this article. Switch to range A. connect the test clips to a suitable acthe buzzer, adjust tone level in phones by means of the volume control, and swing the knob until a dip in tone level to zero is heard. Swing the knob slowly

back and forth, to ascertain dead centre of "null." There is quite a pronounced

B-Buzzer (high pitch if

S1-Two pole six position. S2—S.P.S.T. Toggle.

PH.-2,000 ohm Phones.

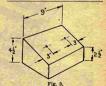
X1-External standard

terminale

possible)

bridge is shown in Fig. 3. The battery switch, headphone jack, external standard terminals and test leads, are located on the rear panel of the unit. The box may be made of almost anything-iron. aluminium or wood. The panel can be ebonite, bakelite, plywood, masonite, metal, or "what have you." But please -insulate that potentiometer and phone

jack! The potentiometer and range selector switch are mounted on the panel in a central position, each 3 inches from the ends of the panel, with the poten-tiometer on the left. The resistor strip bearing the five standards is mounted on the rear of the panel, over the selector switch. If not already provided, file a "flat" on the control shafts so that the knobs cannot shift. Imagine the mess if your potentiometer knob shifts after the bridge is calibrated! Use a knob with two grub-screws if one is handy. Fix a celloloid pointer to this knob—fix it permanently—and mark the pointer with a black ink hairline. The scale is merely a 5 inch circle of good quality drawing paper, glued flat and fixed to the panel with three "self-tapping" screws. This dial is divided into six circles, five for direct calibration, and the outer for a convenient scale of numbers to use in conjunction with graph calibrations and external standards. The scales are marked A, B, C, D, E and F, and the selector switch likewise. Make your test leads of heavy but flexible wire, keep them



dip at "balance," and the audio should completely cancel. Now mark your A scale with ink at the appropriate spot, and enter the value. Try the same resistor on B range. It may also register there—near the extreme "low" end. Back to range A and parallel your cal-ibrator with another 1,000 ohms. Repeat procedure and mark in 500 ohm point on your scale. Now put the two resistors in series and calibrate the 2,000 ohm point. This procedure is used with var-ious combinations until ranges A and

B are completely calibrated. Range C, inductance, is not meant to be a precision range, but will come in very handy in winding or checking RF chokes, large coils, etc. To calibrate, merely use an RF choke of known value. say 2.5 mH., and add several in series Calibrate the low end by using a "coil calculator nomograph" from you Radio Handbook or similar publication, to as-certain the rough inductance of a coil or two. Ranges D and E are calibrated in a similar manner to ranges A and B, using good quality "ceramicon" mica,

and paper condensers Resistors and condensers of known value, which fail to show a normal reading on the bridge, may be safely tossed

into the waste paper basket. Incidentally, don't panic when you find that resistor and condenser values increase in opposite directions on your

scale. This is normal. Now go to it-drag out those dusty old variable condensers, and find out their real value!

THE UNITED NATIONS ON THE AIR

At 6 p.m. on the 17th May, 1948, a new Amateur Station went on the air, for the first time. Not very remarkable perhaps, but its call sign, K2UN, is remarkable.

From Lake Success, at the Head-quarters of the United Nations, Geo. W. Bailey, President of the International Amateur Radio Union, called CQ and was answered by IIRM in Como, Italy. Then the word got round, and contacts were made with Paris, Wiesbaden, Cuba and Bermuda

The station has two transmitters, each the full killowatt of power allowed. One operates on 40 and 80 using doublet antennae, the other on the high end of the American 20 and 10 metre bands, using a rotary beam. The receiver is an HRO. No. 7, the transmitters were made by Temco, and a panadapter is used. Transmitters are remote controlled from a broadcasting type table, which has from left to right: transmitter controls, panadapter, the receiver in front of the operator, the beam direction indicator, speaker and VFO

Why the station has a K prefix rather than a W, is explained by the multi-plicity of Ws not leaving them the letters they wanted, so K2UN was allo-cated, "Come to the United Nations." It is planned that the station be on the

air from 4 p.m. to midnight, American

VK3KG reports what is probably the reports were exchanged on the 20 metre band. It is hoped by the United Nations Secretariat that the station will "preserve and foster the spirit of fellowship among Radio Amateurs, to promote in-ternational interest, and build prestige, for the United Nations."

An Accurate and Inexpensive Wavemeter BY DR. K. M. KELLY*, VK3ALL

This instrument is much the same as any other Wavemeter, except that it is tuned by a slug, and very accurate readings are possible. It operates on the 3.5 Mc. band, and accuracy better than 250 cycles is easily obtained (or within 1 Kc. on the 14 Mc. harmonic). The whole unit is encased in a metal box,

including batteries. Fig. 1 shows the general assembly of the main "works." This was made with the aid of a lathe. Note how the driving rod is prevented from turning, thereby eliminating back-

lach As shown the unit cov-ers 3.45 to 3.85 Mc., and takes about 10 turns of the 4" dial, i.e. about 10' of dial for 400 Kc.! It is easy to log a station, and later to place the receiver on the same frequency for keeping a sked-even to practically the same beat

note on CW!

A harmonic from a broadcast station can be used as a check point, and will give a maximum error of ± 20

cycles, as most BC stations are main-tained within ± 5 cycles for greater part of the time. The circuit in Fig. 2 is straight for-

ward. Headphones are plugged into the a beat note.

C1-Zero Set, 2 Plate Double-Spaced, Variable

C2-500 pF. Silvered Mica. C3-100 pF.

R1-60,000 ohms.

L-Variable Inductance to suit band required. J-Fil. Control Jack.

*C/o, the Vice Chancellor's House, University, Carlton, Victoria,

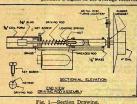
IMPROVED 144 Mc. RECEPTION Owners of the SCR522 can make a substantial improvement in receiver per-

formance by the use of the regular station communications receiver in the same manner that the "Q5-er" is used on the lower frequency bands The communications receiver is used as an additional i.f. amplifier and audio

channel. It is loosely coupled to the last i.f. transformer of the 522 by twisting a wire once or twice around the lead that runs from the last i.f. transformer of the 522 to the 12C8 detector tube. The other end of the wire is connected to the antenna post of the com-munications receiver. The communica-tions set is then tuned to about 12 Mc., the i.f. frequency of the 522.

A shorted plug can be placed in the jack for accurate measurements-the headphone cords make for slight inac-curacy (although this can be overcome by using an audio transformer to isolate

the phones-Ed.). No external coupling, other than the shorting wire on the plug, is needed to produce a signal in the average receiver.



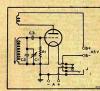


Fig. 2.-Circuit

Rough tuning is accomplished with the dials of the 522 in the usual manner. Then the band spread dial of the communications receiver is used for peak reception.

This system of reception offers all the convenience of low frequency operation: stable easy-to-read signals, band-spread tuning, S-meter, b.f.o., noise limiter action, and a better audio sys-tem. Most important, however, is the improvement in signal-to-noise ratio obtained because of the narrower pass-band of the system. Unstable or badlydrifting signals can be received as usual on the 522 alone by turning the audio gain of the 522 up, while reducing it on the low frequency set.—QST, Sept., 1948.

IN SEARCH OF A KEYED V.F.O.

In various radio publications in the past there has been described Variable Frequency Oscillators which the authors claim could be keyed without any chirp or click being heard when the V.F.O. was coupled to the transmitter.

As the need for a really good V.F.O. on the present over-crowded Ham bands is essential, it was decided to duplicate one of the articles, and thus obtain the claimed for results. Or so we fondly

believed.

In the course of the quest for a chirp tried, ranging from the simple triode to push-pull low frequency jobs. All of these had good stability-until they were keyed-then chirps and keyclicks were evident in the monitor. It should be mentioned that in all cases except the very low frequency oscillators, the fundamental was 3.5 Mc. followed by an untuned isolator stage, and tuned amplifier on the same frequency. Doubling was accomplished in the main transmitter.

If one of the stages of the transmitter was keyed there was no trouble with any of the oscillator circuits. However as break-in was the ultimate aim here,

just had to be found.

In the English "Wireless World" there appeared a cathode coupled oscillator using two 6V6 tubes. The advantage of this type of oscillator circuit over the others is the ease of adjustment. No taps are needed on the coil, thus elim-inating the main source of instability when endeavouring to obtain a T9 note from a keyed E.C.O. oscillator. The position of the cathode tap having a vital bearing on the stability of the note of such oscillators.

This cathode coupled oscillator was

onstructed, and keyed in the cathode. Chirps were absent, but some key clicks could be heard. No doubt these could have been eliminated by the use of suitable filters at the key, but it was thought that better signals could be ob-tained from an oscillator requiring no

keying filter. Looking for further information upon

this problem an adaptation of the Eng-lish circuit was found in QST. This had the tuned circuit in the grid instead of the plate as in the other circuit. With this circuit and using a 6SN7.

keying was tried between the grid of the cathode follower section of the tube, and ground. This time success seemed nearer, as only slight traces of chirp and no clicks were present. The stability was excellent. It was now decided to eliminate the

chirp by using a very low voltage on the oscillator and keying the isolator. This proved to be only partially suc-cessful. Next a completely new V.F.O. was constructed embodying the lessons learned in the previous experimental models.

Gill Street, Charters Towers, Old.

BY E. M. WADDLE*, VK4GZ

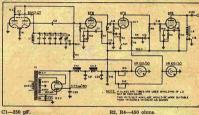
The 6SN7 cathode coupled oscillator was used on 3.5 Mc. with 35 volts from a regulated supply. It was housed in a 7" square metal box of 4" steel mounted on 1" rubber cushions and connected to a 7" x 18" x 4" chassis at one point only by a heavy copper strip.

In order to keep stray R.F. from appearing in the receiver when the oscillator is running, all leads into the oscillator compartment are by-passed for R.F. by means of chokes and condensers. This isolation is essential when the V.F.O. is placed alongside the receiver. Too great an emphasis cannot be placed the importance of completely shielding the oscillator.

Stability of the oscillator was further enhanced by using ceramicons across the coil. Bandsetting being accomplished by the 100 pF., tuning by the three plate midget across the coil. This condenser is mounted on the back wall of the box and connected to the dial by an insulated shaft and coupler.

It will be noticed that the plate load of the second 6F6 is a 3,000 ohm re-sistor. It was used to prevent the interaction which occurred between the R.F. chokes in the plate circuits of the 6F6 tubes; changing to the resistor cured this trouble.

All the tubes and parts used were those on hand. This accounts for the



C2-40 pF. C3-55 pF. C4-30 pF. C5-100 pF. variable. C6-15 pF. variable. C7-0.001 uF. mica. C8. C12. C16. C23-100 pF. mica. C9, C18-0.002 uF. mica. C10, C14, C15, C17, C19-0.01 uF. mica.

C11, C13, C23-0.006 uF. mica. C20, C21-16 uF. electrolytic. C22-40 uF. electrolytic, 400 v. R1-2.000 ohms.

R3-400 ohms.

R5. R7. R9-0.05 megohm. R6-3,000 ohms. 35,000 ohms.

R10, R11, R12, R13, R14—0.1 megohm. R15, R17—10,000 ohms pot., W.W. R16-25,000 ohms V.D L1—17 turns 18 gauge 1½" long, 1" diam. L2—28 turns 24 gauge, 1½" diam., tuned with 1" brass slug 3" long. T1—400/400 at 150 Ma. Power Trans-

former, 6.3 v. at 3 amp., 5 v. at 3 amp

CH1. CH2-100 Ma. Filter Chokes

Following the oscillator were two isolators and then the final amplifier. All of these stages used 6F6 tubes. These were used for two reasons. Firstly they were to hand, and secondly, they have petter isolation between the grid and plate than the 6V6. These stages were operated at Class A. The final stage was slug tuned to 3.5 Mc. Keying was accomplished by keying the cathode of the second 6F6. better isolation between the grid and

By means of a resistor network across the output of a 150 volts of regulated supply, the screen voltage was kept down to 40 volts. This produced chirpless and click free keying.

resistance used in series with the VR105 to drop the voltage to 35 for the oscil-lator, which is definitely not done in

the best of VR circles. It is very important to see that the V.F.O. power supply has a two section filter, and that the capacity used across the chokes is high. This applies to a lesser degree to the supply of the trans-

mitter. The final slug tuned stage is broad enough to cover the band without adjustment, once it is set for the middle of the band. It is capacity coupled to the grid of a 6L6 in the transmitter by a 100 pF. condenser and a length of coax. Excitation is sufficient with this stage to operate the 6L6 as a doubler to drive 807 to 14 Mc. direct, or as a quadrupler to the same frequency.

After tests were run the oscillator drift was further reduced by reducing the oscillator plate voltage to 22 volts and the heater voltage to 3.3 volts.

A series of tests with about 40 stations, both VK and DX, since the completion of the unit, showed the reports were invariably T9 or T9X. In fact only four stations reported the signal as being T8, indicating that providing you take the trouble a V.F.O. can be keyed without sounding like a bad disposals job.

CONTEST NEWS.

VK2 Wins Remembrance Day

The average of the six highest logs for the Perpetual Trophy are as follows: 219.66 Points

199.35 VK3 183.66 VK5 142 66 VK7 120.66 110.66

Congratulations to the VK2 boys for their fine effort.

The first Remembrance Day was very successful and everyone participating enjoyed it to the full. It is a pity that more stations did not take part, but probably insufficient publicity contributed to this. Eighty-eight scoring logs were received and several check logs. A large receiving log was to hand from Eric Trebilcock and if more listeners were as enthusiastic as he, a listeners' section would be possible.

Many letters were received from par-ticipants congratulating the W.I.A. on the spirit behind the Contest. These letters were appreciated and it is hoped that in this, and future, years this Contest will perpetuate the memory of the "Silent Keys" in Amateur Radio throughout Australia.

INDIVIDUAT COOPER

INDIVIDUAL SCORES							
New South Wales							
2ZH	245 Pts.	2VA					
.2PA	244 "	2YC					
2VN	212 ,,	2ZX	. 81				
2AHA	211 ,,	2ARH .					
2EO	203 ,,	2HZ					
2RA	203 "	2WD					
2GW		20W					
		ZAKO .					
		. 2PN					
20E	153 "	20V	. 20 "				
2JX	152 "	2HC	. 16 "				
2DO	145						
		oria					
3XK	228 Pts.	3BB	. 85 Pts.				
3MC	191 "	3ZC	. 84 "				
3UM	182	3VQ					
3YS	181	3ADG					
3IG		3WH					
3AWW		3AGF	00				
3BD							
3JZ	154 "	3KV	48 "				
	153 "	3TX					
3JI	129 "	3ZR					
3DG	118 "	3RJ					
3JE	100	3GZ	. 40				
3QK	99 ,,	3YF	. 33 "				
3FF	88	3KB					
Queensland							
4XJ	. 169 Pts.	4SN	89 Pts.				
		4HZ					
4NO							
4JF	95 ,,		. 30 "				

5RX

5RK 56

61 "

5OU

5FX 5KE

152

138 111

	Western	Australia				
	284 Pts.	6GA				
6KW	253 ,,	6WT	98 "			
6DX	188 "	6CF	72 ,,			
6FW	182 "	6FA	55 "			
6KF	134 ,,		52 "			
		mania				
	205 Pts.	7AL	101 "			
7DS	156 ,,	7SJ	90 "			
70M	142 "	7BJ	30 "			
PRIZES IN DX CONTEST						

For the 3.5 Mc. Section, an Extension Speaker with adaptor has been allotted. This prize was, by error, allocated to the Receiving Section in last month's list of prizes.

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Secretary.-Wal Nive (VK2XU), Box 1734, G.P.O., Sydring Night,—Fourth Friday of each month at Science House. Corner Gloucester and Essex Sts.

Divisional Sub-Editor: H. F. Trehame, VK2BM, 5 Walmes St., Burwood

Flat, 144 Hewlett St. D. Cuffe, VK2AM, 779

VK2WI.—Sundays, 1100 hours EST, 7190 Kc. and 2000 hours EST 50.4 Mc. No fre-quency checks are available from VK2WI.

VK5W1.—Sundays, 1000 hours SAST on 7166
Kc. Frequency checks are given by
VK5DW on Friday evenings on the 7 and
14 Mc. bands.

VK6WI.— Sat 2 p.m. Sun, 9.30 a.m. W,A.S.T. between 7000 kc. and 7200 kc. No frequency checks available

VK7WI.—Second and Fourth Sundays at 1030 hours EST on 7174 Kc. No frequency checks are available.

VK3WI.—Sundays, 1130 hours EST 7196 Kc. Individual frequency checks of Amateur Stations given when VK3WI is on the air.

VK4WI.—Sundays, 0900 hours EST simultane-ously on 7109 Kc., 14342 Kc. and 52,004 Mc. Frequency checks are given two nights weekly, and the hours are an-nounced during the Sunday broadcasts.

Secretary.- G. G. Augustesen, Box 638], G.I. Meeting reight.—Lest' Friday in each month at State Service Building, Elizabeth St., City. Divisional Sub-Editor: F. H. Shannon, VK4SN, A

SOUTH AUSTRALIA

Secretary.-E. A. Barbier, VKSMD, Box 1234K, G.P. Meeting Night.—Second Tuesday of each month

WESTERN AUSTRALIA Secretary .- W. E. Coxon, VK6AG, 7 Howard St., Pe the Builders' Exchange, St. George's Term

Divisional Sub-Editor.—VK6WT, Mr. D. Couch, M. Street, Watermans Bay, W. Australia

Secretary.--J. Brown, VK7BJ, 12 Thirza St., N Meeting Night.—First Wednesday of each month the Photographic Society's Rooms, 163 Livery * St., Hobart. Divisional Sub-Editor.-T. Connor, VK7CT, 385 Elizab

Correspondent.-C. P. Wright, VK7LZ.

FEDERAL DX C.C. LISTING

PHONE: OPEN:

have been ADT.

ided to list in future the number
by DX Century Club members,
ers therefore kindly drop a note
benefit mentioning their Zones the Federal Secretary mentioning their Zone and total for inclusion in next month's notes REMEMBRANCE DAY CONTEST

AUSTRALIAN AMATEUR CALL SIGNS New Issues:-

VK2ABA-F. A. Barry, 374 Victoria St., Darling-2ACH-H. C. Hickin, 3 Mount St., Hunter's Hill. 2AGE-L. N. Machechian, 75 Weston St., Harris 2AGK-A. B. Girling, Cobbora St., Dunedoo. 2AGP-G. E. Lewis, No. 7 Flat, 14 Kanzaroo St., Manly. 2AGT-J. K. Langley, 37 Acton St., Hurlstone K. L. Finney, 73 Eastern Road, Tarra-2ALC-L K. Connor, 104 The Boulevarde, 2ALD—R. Smith, Sowell Rd., Macquarie Fields. 2AMD—H. V. Booth, Kembla St., Wollongong. 2AMK—L. A. McPherson, 39 Addison Ave., Rope-2ANB-N. T. Buchanan, 41 Sir Thomas Mitchell J. B. Doran, The Presbytery, Allen, 2 Div. Sig. Regt., Moore Park

B. Brown, rm.
Vaje, Balgowish,
G.—R. O. Chapman, 67 Arabella St., Longue-ville (Mobile, 4. Terry, Rd., Eastwood,
VI.—W. S. Arnold, 4. Terry, Rd., Eastwood,
—H. W. Blae, 55 Leura Rd., Aubarm,
B.—A. B. Monk, Ruilway Cafe, i Diamond Woodward, Main St., Mooroopna. Harding, 25 Guthrie St., West

Gallaghar, 35 llka St., Leichhardt. Brown, The Vale, Pitt St., Manley

AMP—A. W. Harding, 20 summer 2.5 All Emselved and Control of the C Wodonga. SAWH-W. Hampson, 147 Bayne St., Bendigo. SAWR-W. E. Knapp, 13 Chatham Rd., Canter-SAZH-N. B. O'Brien, Flat 3, 27 Dolphin St., SNZ-R. H. Hall, 36 High St., St. Kilds.

30D-O. W. Welsh, 14 McPherson St., No Plains, Brisbane.

Plains, Brisbane.

4LU—D. V. Reynolds, Flying Boat Base, E -D. A. Crowley, 24 Parade, Norwood, -D. A. Millar, 195 Robin Rd., Semaphe -P. Muscat, South St., Magill. -K. M. Theel, 8 Caulfield Ave., Clare

5RN-D. S. Robertson, Maroonika, Mt. Loft VK6LD-C. E. Bishop, 14 Weld St., Claremont.

VKGLL—O. E. Bishop, 14 Weld St., Claremont. VKSWL—J. Weldup, c/o. O.T.C., Kavleng, N. Ireland, N.G. Alterations.— VK2ACG—A. Morris Rees, Kingston Guest Hor Kingston, A.O.T. 2ADC—G. S. McLeod, "Modwina," Stoney Or 2AGZ-R. C. Yates, 28 Prince Albert St., M 2AKB-K. B. Brown, 73 Western Cres., Gla 2ALR-B. Hannaford, Flat Rd., Bolwana, W. -S. C. Fletcher, Royal Hotel, Kempsey, L. D. Cuffe, 30 Bradley's Head 1 Mosman.

Mosman.

Mosman.

Martin, 36 Breimbar St., Grafton.

2FM—F. A. Murray, c/o. M. T. Pickard, 2 W.

Liace Pds., Lindfield.

2FR—J. F. Howarth, "Milton," Sydney F

Amateur Radio; November, 1948

3ARL-O. L. Brown, 32 Ward St., Ashburten. Y-R. G. Henderson, 201 Bouverie St., Carlton.

—R. B. Jones "Lesebray," 25 Panoramic Rd., North Balwyn.

3BH—C. R. Whitelaw, Box 92, P.O., Dandenong.

3HI—L. G. Reynolds, 21 Nirvana Ave., East G. Burke, 97 Riversdale Rd., Cambarwell SSD-C. D. Werdsworth, Calulu, via Hillside.
SZH-C. H. Hyatt, 30 View St., Alphington.
SZF-G. G. Coventry, Warnick Rd., Greensborough. borough.

4HF—H. A. Pitzalan, Highland St., Wavell
Heights, Brisbane.

4SD—A. H. Sharland, Boomdall, Brisbane.

4XE—F. H. Doherty, 3 Oxford St., Hyde Park,

Townsville,
VK5AZ—H. R. McGrath; c/o. Dept. Civil Aviation,
Daly Waters, N.T.
SBW—A. W. H. Wright, c/o. A. E. Wilson, 58W—A. W. H. Wright, c/o. A. E. Wilson, Miltalle, via Cowell, 52Z—L. E. Hauber, 220 Goodwood Rd., Colonel Light Gardens.
5MA—A. J. Martins, c/o. Electricity Trust of SA., Bert.
5MZ—A. M. Yonkin, 23 Third St., Sallsbury.
5MZ—A. M. Farszecis, 108 Annac Highway,

Glandore. 5XX—R. de E. Minchin, 14 McGilp Ave., East Glenelg. VK6RB—E. P. Robins, 4 Egina St., Mt. Hawthorn. 68R—Radio Society of W.A. Inc., 8 View St.,

08R—Radio Society of Station 7HO, Hobart. Subiaca. VKTGC—C. D. P. Clarke, c/o. Station 7HO, Hobart. 7MY—A. H. Morrisby, 48 Central Ave., Moonab. VK9BP—8t. P. O'Connor, Dept. Civil Aviation, Rabaul, N.G. 9NR—N. G. Roberts, c/o. Dept. Civil Aviation N. G. Rober Norfolk Island.

Norfolk Island.
Cancellations:—
FKZABE—A. E. Misdale, Barrenjoey Rd., Newport 13 ABE—A. E. Misdase, parreago, and Beach.
Beach.
2 MO—R. A. Joscelyne, 71 Cheltenham Rd., Cheltenham.
13 ACB—G. F. Curboon, 26 Jersey St., Balwyn.
30W—S. L. Hammock, 67 Delaware St., Reservoor.

P. Broome, 111 Days Rd., Grange, Brisbane. 48.5—A. S. Samen,
Bribban Medhunt (decessed), 9 Beach Rd.,
VK7.H.—R. Samen Medhunt (decessed), 9 Beach Rd.,
VK9JO—T. S. Hefner, Aust. Petroleum Co., Port
Moresby, Papua.

FEDERAL OSL BUREAU RAY JONES (VK3RJ), MANAGER

The QSL address for Morocco is Service QSL A.A.E.M., Postbox 50, Casablanca, Morocco. Alfredo Quintana, QSL Manager for Chille, advises that for better service all cards should be addressed to P.O. Box 761, Santiago, Chile. Alfredo also desires to exchange stamps with any Australian.

politation.

Recently a paragraph in those notes give a new Recently a paragraph in those notes give a new Recently a paragraph in the second secretary of the A.R.I. has now written stating that the new address given is not customer and CRL address for Inly therefore remains as A.R.I., via San Pacho J., Millan, Edy., via San Pacho J., via San P

tation, Port

Now You'll advanced to KAIPT, care healting of Tech-Mail addressed to KAIPT, care healting of Tech-English and the Care of the Care of the Care The Rails Care of Care has been relieved to the Care of the Care of the Care of the sevent of the Care of the Care of the heavy worked at least one station in each of the seven made after 10th Norwhelp, 1945, 3th he acception. The seven cords should be sent to Balley with the Care of the Care of the Care of the Care of the Persistent with the Certificate, the "copyguined by relative the Care of the Care of the Care of the Care of the National American receipt in Hungary, styled the MERE, which to Deglish makes Repairate Sopriwave Amateur League, with the address as Box 185, Budspest 4, Hungary, The QSL Bureau is situate at the same address.

Notes suitable for inclusion in this column are From Reg Jepson (VKSJI) comes the information that Frank Soitis, ex-HLIBA and J2AAY, is now



take in U.L. with GPT as WSQID 14 was considered and U.L. with a series of the series

goes that the different who kindly supplied him with his call and address. If the culler was genuine he can collect his card from VK2NF. Any pirate who should apply will receive a unitable welcome.

NEW SOUTH WALES

Mr. N. H. Hicks 2.2MA gave members a very instructive lecture on "Indicateal Electronic Conrow" at Science Home under the charimonish of account of the Control of the Co

FASTERN ZONE

Activities to the Eastern Solvities Institled this Activities to the Eastern Solvities Institled this Good to be look as well as for giving section. It of the Eastern Solvities of the Eastern Solvities and Solvit

WESTERN SUBURBS ACTIVITIES

keeps 1 dook out for 2AX or 2 Mc.

WESTERN SUBJURBA ACTIVITIES.

W Stanley 'Ulloway' accents: 'Better strex to old one buil Sounds like talking into two pint joog!' All ended well, 20Q still works the DX on 20, 2DW not heard often. 25M still on 144 with a 40 ft. high dipole, gets out well. Harry also goes mobile with a 322, 2TD works some DX on 7 Mc OW

when he can tear himself away from that old coment mixer. No, not the rig, its business. Don't forget to pass the word! Thanks chans.

forget to pass the world Thanks chaps.

It this NYMEY SOUTH 200HE which the chaps its thin a control of the chaps its thin a control of the chaps its thin area are doing. Most seem to be insective at present but a few of the regulars on the chaps its thin a control of the control of the control of the chaps of the control of the contr continue what about letting me know what you are doing so that I can include some really interesting news next month.

where there must be compared to the compared t

settled in Mosman, and punching out a nice signs on 10 phone 1, Ma and 11W till Probilities. His going up, Mac? 24G is in process of rebuildin the rig late a beaut rack and panel layout 24 heard working 11MT, his new folded dipose lendin of 40 phone these days—ann thinking of signin him up as a marker for the band?

alon up as a marker for the bandel of the property of the prop ST. GEORGE

Thanks to 2YL and 2YG for their interesting letters on their DX activities. Remember chaps, the more information you send in the more interesting these notes will be. From 2TB we have the following suggestions: I would like you to let me have your comments and any further suggestions are have your comments and any further suggestions.

1. How about forming an "S9" W.A.C. Club (either phone or CW)? Its members could con-tribute for a special set of cards as has been done by the Pearl Harbour, Corpus Christi, KZS, doze by the Pearl Harbour, Corpus Christi, E&Z, RY and Pranskred Clubs. W. 50 Phones. The read to DX CC, phone is tedious for VKs. 1 know how hard it is as I have 141 countries, 28 zones and 84 on phone. The latter appears to be zone and 84 on phone. The latter appears considered to the phone of the harder Europeans.

3. How shout a Junior DX Club for those who hit 30 countries? Many Hams take Ham Radio hit 30 countries?

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as a hobby and are not slavishly chained to the DX urge. 50 countries is a fair effort for recog-

mitton. Well, there's something for you chaps to think over and don't forget to let me have your ideas. G. F. Oli, 6W, Ol. E. U. de for Europe and Asia. South America being represented by HOTDG, HOLLW and YVAGC. Central America 1910, 1713-170, HOLLW AND YVAGC. Central America 1920, 1714-170, HRIMB, VIPPF, and COULIV. Article Vigolit, Vigolith, Vippill, ZDIAH, ZDIAH, ZDIAI and VIVAGC.

TORAIT. VORDITY. TORAIT. 2014 AIR. 2017 of some Torait. The configuration of the configuratio

30-99, 210 84 countries.
Here are a few QTHs for those who need them:—PZIFM: P.O. Box 118, Paramaribo, Dutch Guiana.
CTSAB: J. A. Ferrax, Rua de Santa Maria 261, Funccai, Madeira Island.
ISIERI: G. Marrax, Vilhe Régina Elena 21, Cagliari,

PJOX: via W8NBK.

NORTH COAST AND TABLELANDS 2ZY active on 40 only, is on the job constructing hand-switched 12 tube super around the multiband coll unit recently announced. 2RK away on holidays. 2FN back to school again after the vaca-tion; rather "browned off" due to a move to a tion; rather "browned ou" due to a move to a village with no AC! 2ARJ experimenting with 50 Mc. gear and has had excellent cross-band contacts. No luck with 2PA who is 80 miles away, 90 per No first with 17th, who is the sawy, 70 Jee of the county of the distance of the county of the

NEWCASTLE

NEWGATE Best areas of the month is the artical on of plane using seech clippte and he will not be the plane using seech clippte and he will not hear of the seech clippte and he will not hear of the seech clippte and the will not be the seed of the seech when the seed of the seech clippte and the seech clipp

his century on 10 points.

COALFIELDS AND LAKES

2ADX active on 28 Mc, as well as 144 Mc, using new beam on 10 and only Maitland station heard. From Kurri 2KZ and 2KF keep the place on the map, 2KZ very close to realising, his ambition of W.A.S. on 10 metros. 2KF liable to be heard anywhere but usually on 10. 103-116-116-12 kE

going to form on 30 beans, good signal and beam bringing results. 2TY doing intoly on 10 bloose, worked 19 new countries in three weeks. 2ADT estiling down to some DX after the rebuild, on 6, 10, 11, 20 and 40, cards away for DX CC, and 6, 10, 11, 20 and 40, cards away for DX CC, and the rig has a wog in 8, 2PX not heard, QRL work. 2OC and 2RU active on 6 metres from Wyong and Gostock. 2XI, working 20 and 10, but finds the

conditions patchy.

SOUTH PLAY FAMP TABLELANDS

wheleagong Cith that a new Hem will sheetly join 2524 A. Burton very active, and a bet of the gang are becoming acquainted with the gaze and becoming acquainted with the gaze and the property of the propert

whith linewing. BDD monaged a counter for the country in the transportation of the country in th happy with it.

WESTERN

TITL existing roof remain from the extension of the state of

VICTORIA

An old-timer in Charlie Whitelaw VK3BH has been appointed and evern in as a Justice of the Peace for the Central Ballivick. His beam and tower has not yet been erected on account of delay of supplies, illness of his wife and self, but has hopes for some results early in November. EASTERN ZONE

The fourth Eastern Zone Convention will be held at Leongatha on 27th and 28th November and a cordial invitation is extended to all Hams to attend. These contemplating making the trip are requested.

to notify 3QZ or 3DJ so that arrangements for ac-commodation can be made. The programme will be a seen as a port as a seen as a seen as a seen as a seen as a morning impact local Ham shacks, and it is re-quested that as many as possible bring portable 50 Mc, gear with them as the rest of the day will be spent hunting for a hidden 50 Mc. transmitter.

word husing for a fiden of Mc. Immunities. For further formulation is suggested that misses and visitions and visitions in the state of the fident fields before and visition in the fident fid

his arganis on use sates.

day. I and 3VL keep nightly skeds on 6 and rag chew for hours, they talk on anything from applies to radio! 3AKM is reported to be building a new tower for his beam. Nothing has been heard of 3BB or SALE lattly but believe they are active on "Me. Does anyon know that are all the form of the control of the same anyone know that are all the form of the same anyone know that are all the form of the same and the same and the same anyone know that are all the form of the same and the s and or 3.40 terms. Another hard Seen hand of the seen hand of the seen hand to see the seen hand to see the seen that the seen hand to see the seen hand to see the seen hand to see the seen that is seen that the seen that is seen that the s

on all brands.

The monthly meeting of the Eastern Zone Sub-The monthly meeting of the Eastern Zone Sub-The monthly meeting of the Eastern Zone Sub-The Control of the Eastern which while be held at the balcomise Camp on the 8th November. There was an interesting and in-formative lecture on VIIF and UHF tabes, and tuning systems, and a demonstration of the various effects of modulation as seen on a cathode ray effects of modulation as seen on a cathode ra-oscilloscope (double beam) given by Sgt. Roberts

NORTH EASTERN ZONE

Zone hook-ups are now entirely on the 80 metre band. First Sanday 9 a.m. and third Sanday 9 p.m. net to 3690 Kc. The majority dayored this arrange-ment, the only ones against being those too lay to erect a balanced antenna to climinate BGL However, by recent developments it seems as though nobody wants the zone, and probably it will just drift

apart.

GUI had a 'week visiting SDI, GCI, 3RR, SHK,
8ABA, 3YS, 3PG and SHT. Six metres was main
interest for Alan, and he came home with many
fresh ideas. Now planning a super set-up. 3DW
has been on holikay also. Not much dope on them,
as I only heard the last couple of hours of his
contact with SKR. Doag's antenna came down in the breeze when the strings gave way. It is now up again with string repaired. 3KR is in good form again after the flu. Ken is keeping fist in on 20 metree. 3TS had his 6 metre signals heard near

20 metres, 3TS had his 6 metre signals heard nex Foster R5 S5 on phone; Tom is rebuilding for S6

60 meles. This had he is general expenditured to the control of th

CENTRAL WESTERN ZONE CONVENTION
AT HORSHAM
Central Western Zone Convention, although timed
for 2 p.m. on Sunday, 12th September, really
started, with the arrival of 5PB and 3TV on Satur-

Greek with the arrival of they and staff we have been all the staff with the arrival of they are staff with the staff with the

whather with the war dispersion of the control of t

the business continues to the continues of the business of the

Semigence, 1470 Changers and Secondary, 28,510.

Semigence, 1470 Changers and the use Secoled to Semigence and the secondary of the Secondary and the Secondary and the Secondary and Se

surprising shapes and we return home with a better appreciation of each other's personalities and prob-lems. Picase gang don't forget the problem of the Zone Hook-up at 2 p.m. on the second Sunday in the month on 7120 Kc.

QUEENSLAND.

In spite of heavy rain, a large attendance of members was present at the September general meeting. The President (4AW) occupied the chair. Discussion on the conduct of general meetings was Discussion on the conduct of general meetings was opened by 4KB, who expressed the opinion that Council should deal with all business and that general meetings be devoted to a report from Council, and a lecture. The motion was supported by 4FN, and was carried.

At future general meetings, members will wear identification tabs. So fellows, no more wendering who is sitting next to you; just read his disc and

when the state of the state of

As the man of 1,000 points, and 1,32 fells with a contract variety of 1,000 points, and 1,32 fells with the Contract vary in 21, hoppy, 1,47 working Zi. on Crypton 1,000 points, and the contract vary in 2,000 points, and the contract vary in 2,000 points, and the contract variety of 1,000 points of 1,

gnals now coming in at good strength at During the day the band is fast becoming a night. Juring the day the band is fast becoming a DX hunting ground. 4PG, 4HE, 4JP and 4XJ are reported to be doing very well. Countries heard fairly consistently are W, ZL, J, KG, PA, GI, HC and by far the best of all, G phone stations:

ZONE NEWS

COURT ZONE (NEW)
COURT

a new sone has been forthed with Intry Dearness are dKW, 4FH, 4KW, 4GW, 4KR, 4MA, 4MI, 4AM, 42P and 4EQ. The latter is an ex-YKD. We have to on good subthority that the Mackay going are seeking passports to Chile. A certain XYI, in Arto-are getting clouds. The other night a VK2 tried to gate-crash the party and Sara repiled in some with "Illed your hand out neapity" loy." Not a

had idea for those VFO men who use netting to

South-West (4ER).—4UX paid a visit to Laidley during last week-end in September. Chaude and 4LD showed the W.I.A. network what can be dose with a piece of string soaked in brine as an antenna. 4LD is a butcher so no doubt the next antenna to

lprwich (4W8).—Not much news from here thi month, but big moves are afoot in Ipswich and whope to have a swag full of notes for the next issue In response to my plea for information (September notes) I am very pleased to be able to report that about a dozen VK4 Hams wrote to me

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during the past month giving details of the gear being used, activity and personal items. Many thanks, chaps.

SOUTH AUSTRALIA

The monthly some and morting of the Institute was held the sensal times of pince to a very representative gathering. Max Farmer (GFF) gave a very interesting dessociation of V.H.F. working a very interesting dessociation of V.H.F. working prompts demonstration of 50 centimetre working probably the first in VK.G. Hin to Iv.K. This portion many and raried were the questions asked. 51M proposed a vote of thanks which was precised with proposed a vote of thanks which was received with proposed a vote of thanks which was received with of very low "river," but I assumed to decipher the following: ZL2LT, VERIQ, ex-GSCNW (who by the vary is settling here) and a contril a velocime was see). Members were notified of the forthcoming xma Social which is always held in conjunction of the contribution of the contribution of the thread of the contribution of the contribution of at the Arvadia Cafe on Thursday, 9th Documber, The guest spacker will be the "Proff." Sir Kerr The guest spacker will be the "Proff." Sir Kerr

ant.
Why is it that VK5 Hams get sat on hard for y clicks, over-modulation, etc., and yet VK3 and K2 boys can sound like a thunderstorm working, by that have they got that we haven't? Don't

up. What have they got that we haven't Joest Why did Jee McAllister sound so subdeed whilst doing the W.I.A. broadcast from "Doc's" QTH the other Sunday? Was it the psychological effect of the extrement? Dava, dear me, sitting next to improve one's overbolary. Thank you Ross. Chief news from the city this month, stranger onesph, concerns the country, to wit, Claracal

its very nicotorial field (by Undertunately I was and I hard filts the field day celebration were and I hard filts the field day celebration were and I hard filts the filt day celebration were filtered to the filt of the f So notices or 10 continuentes—EA). Everybody was then invited to 'hep in," a somewint immeessay invitation, and then for the next half hour all Amigo, at down) of eidparts. When supper was finished, it was suggested that all the gang move to adjourn and meet a couple of "opportunent." SOF and SLW were hard to mutter constituing about them came to like as they as we taw 'to "opportunents', but the suppersistion of the suppersistion of the suppersistion, waited in the back of the car (ver, you guessed it, two telephones "opportunents").

Special mention should be made of the enthus-Special mention should be made of the enthusiam of the two new Hams 5PQ and 5RB, and the ingenuity of these two "scroungers de luxe." To attend the field day they had been on the borrow for weeks, they borrowed a Type A Mk. 3, borrowed an like, borrowed a power supply, borrowed the additional and bloom for dotter it they allow known at a ready and the class of the part of the property o

exhausted tubes in the pond, I would not know at I was not there.

Talking about fences, there seems to be quote an argument going on as to who is going to pay for the ten yards of fence that our organiser ripped out when his car arm backwards down hill. Never mind Jos, when the boys get the refunds from the disposal gore that they are and going to get, there disposal gear that they are not going to get, there will be plenty of cash around. We will be plenty of cash around, with a commercial station from a substrian Church had a decided Radio Amazeu favour, with 5XI as organist control technician, and 58C as control technician would be supported to the substriated by the substriction of the substriated by the su work on the organ sounded very close to it. I am informed that a certain VK5 Ham nearly had to have the "Doctor" when he discovered that he had accidently been parked on SWI the other

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Amateur Radio; November, 1948

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budge morning. Anyway it helpful to balance out of VRI QOM. Had the east firm beey V.F.G. be of VRI QOM. That the east firm beey V.F.G. be the processor of the pro-duct of the processor of the processor of the white IA all mosts, so I can forestellar over to the processor of the variety of the processor of the VRI that the processor of the processor of the VRI that the processor of the develop communica-tion of the processor of the processor of the pro-teating the processor of the pro-teating the processor of the processor of the processor of the pro-teating the processor of the processor of the processor of the pro-teating the processor of the processor of the processor of the pro-teating the processor of the processor of the processor of the processor of the pro-teating the processor of the pro-teating the processor of the processor of the processor of the processor of the processor

ment, ray, wit, "Never take concell for dimmed.

AO was been in remark on the air that he had not been to be an extra the second of the second

WESTERN AUSTRALIA The October meeting was held on the 11th, and

there were 48 members present. A new member, VK6AV, Ivan Norman, was elected. It was decided to held the VK6-DX Contest at the latter end of November, the rules being obtained from an existing able to use the present premises for meetings in the future, and all members will be advised of the new rooms as soon as arrangements have been

malised.
68.A mentioned the difficulties encountered in having "Commercial Pirates" on Amateur bands. A report will be submitted by the Council to F.E. to ascertain what can be done to overcome this problem.

6RU said that it is believed that the S.A.R.L. are destroying QSL cards received for non-members in South Africa. The L.A.R.U. will be contacted

Country members please note that the Annual Dinner will be held on 3rd December at the Marville Tea Rooms, Hay Street, Perth, and a cordial invita-tion is extended to you all, to be present should ecasion permit gave an interesting lecture on the equip-

6FU gave an interesting secture on the equipment at his station. Antennae, transmitters and receivers with circuits were dealt with in detail. Frank has equipment for 7, 14, 27, 28, 56 and 144 Me., AM and FM. Frank has equipment to r. 14.4 Me. The difficulties encounter with bits 14.4 Me. The difficulties encounter beer of great anothen to other members intending to get on that based. 638 produced a Wire Recenter, and we heard correlves as others heart no on the air, It is hoped correlves as others heart no on the air, It is hoped to be a second of the strates when the "Deggs" are ironed out of that eWS "Skipper" came into his own by handling an Auction Sale of junk that was brought in by the Amsteur for the Amsteur, at this meeting. The

sale went very late, and the meeting gradually dwindled and wound up shortly after 11 p.m. PERSONALITIES

6XD is now putting out a signal on 25 Mc, and with his new hourself, and a signal on 25 Mc, and with his new hourself, and the "Shift-Workers Band." 67X has been getting his some nice 7 Mc, phone DX. A ZE contact pleased him immensely. Hope the new QYII is a pleased him immensely. Hope the new QYII is the pleased him immensely. Hope the new QYII is the pleased him immensely. Hope the new QYII is the new please of the pleased him immensely has been getting and the new QYII in the please of the please of the new please of the please of the new please of the please of the new please of the time all the cards are typed.

the time all the catus are typen.

6AQ of Toodyny, What's happened up there Leo?
Don't tell us the DC mains keep you guessing!
6RL hunting the DX on 28, 14 and 7 Me. Ralph's
8 watts is bringing him some very BR QSOs, 6WD
is still on 7 Mc, phone and OW. Wally's new
crystal mike sounds good too, 6X1 loat his 28 Me. beam in a recent storm. Fortunately, it didn't go far—only came to rest on the roof of the shack! 6LM puts out a whale of a signal on 7 Mc. If Lionel docen't get 89 from VK3, he doesn't blame ditions!

conditional

GIW travels ground the hand with a YVI, it.

GIW travels ground the particle amplication of the new modulator, John's phone right particle amplication of the new modulator, John's phone right particle amplication of the new modulator, John's phone right particle amplication of the particle amplic

GRU did a good job in the VK-ZL Contest on CW. Jim's got it all sewn up. 6KW active entrain for the phone section of the Contest. These two chaps keep VKS well on the map. FB Ron. 6AG was popular when he announced the arrival of some was popular when he amounced the arrival of cases of the contract of the contr

self at crysial milks. Dae pasts out a really also GMD have; been harden on musel takey. Those GMD have; been harden or the self-tion of 605 and 61K can be heard every family at the GMD and 61K can be heard every family after the WLL, Boundont on T G. How about after the WLL, Boundont on T G. How and some Th phone on T Mc. They say that Katanoine GMT attack going on down there in Albury, Gravet Can't you put the boys and action again? GMT attack going on down there in Albury, Gravet Can't you put the boys and action again? GMT attack going on down there in Albury, GMT attack going on down there in Albury, GMT attack going on down there in Albury, GMT attack going on the self-GMT attack going on the self-graph have been looking for you Len. GKE is going quietly for a while, but we have what can designing his new receiver. H is already working and the self-GMT attack going the self-graph there is the self-denigning his new receiver. H is already working 17 Prankl. 2

TASMANIA

The October meeting of the VK7 Division was attended by some thirty members and after the general basiness was concluded, an interesting and instructive lecture on beam construction was given instructive lecture on beam construction was given by Athol Johnston 7AJ. By the way, Athol seems to have suicidal tendencies the way he describes his "diving up and down" the pole on which the burning the most VI

his "drifting any and down" the pole on which the Debring the mostly NX boll one of the pole and the pole of the p

outting in a nice signal on phone to Hobart and TLJ has just rebuilt and in fact nearly every Ham in Hobart has rebuilt, is rebuilding or intends to rebuild, so I think yours truly can make enough

re to rebuild also, Two of our Associates sat for their telects at the October examination, and are now anxiously awaiting a thick or a thin envelope to tell them below the control of the con our Associates sat for their tickets at

FIFTY AND UP NEW SOUTH WALES

All binds very active owing to the VHF Contest the is currently operating now and everybody castle and 21Z and 21X. In Rationals, seen to be well to the fore at this stage in points scoring, but results will probably fluctuate as time goes on. No IXX hevak-through as yet, but everybody living and listening in high hopes that Sporadic E refer-ence where the content of the content of the content of the second content of the content of the content of the content of the second content of the content of the content of the content of the second content of the content of the content of the content of the second content of the content

and listening in bign toges them. The strength of the strength lengthy conversations irrespective of Contest or otherwise. While on 144 and 288 Mc. 2ABZ, 2LZ, tengary conversations irrespective of Contests otherwise. While on 144 and 288 Mc. 2ABZ, 2 2AH and 2VW are very active discussing this that at great length.

The following stations are co-operating to

2HL and 2AJR.

and TALL, 200 Me. 24,00, 1870, 1872 and ZAME, proceedings of the position, the arguests of a right direction and abund 100 least through, there are not some of the processing of the processing

OUEENSLAND

50 W.—Boore the fix Spelman State the Young the Brown was the Spelman signal continuously on time some contact with Asia soon. 144 Mc.—Brisbane VHF men 4HR, 4RY and 4ZU tursed their beams westward last month in the bose that contact would be made with 4XV the bose that contact would be made with 4XV

solt three their peans westward as mount in the hope that confact would be made with 4XN of Dalby, But their luck was out. Two country members, 4YL and 4KK, hope to make history by putting the first 144 Mc, sig across the Downs-Wish you luck Norm and Keith.

VK6KW's 144 Me. EQUIPMENT n 9003 RF stage (original), 9003 Mixer (original), 9001 Harmonic Amplifier (original), and a 9003

The equipment of this Station consists basicly of a Bendix type SCR522, modified for use on this band. The main modifications have been carried out on the receiver, and the line-up now consists of

Amateur Radio; November, 1948

Oscillator. This last type was originally a Har-

The LF, stages have been left as they were, at the audio system has been altered, and although the tubes are still being used, the transformer coupling and intercommunication asstems have been removed. The two gauged condensers have been gauged together, with one common dial being used. The over-all sessitivity of the receiver and audio gain seems to be muite good

seems to be quite good.

The transmitter is practically as it was originally. With the automatic frequency changing apparatus left in its entirety, four crystals being available for selection from a four-position switch, which is mounted on the rack, but provision for keying tone has been incorporated.

tone has been incorporated.

A pressal exciticated type hand-set is being used for both microphone and receiver with peas-to-talk of the hand of the h

from the 1225 output tube.

The striken can be made portable in a few minThe striken can be made portable in a few minof a No. 10 generator. The generator critical
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loss: 144.652 and 146.852 Mc.
The main aincome ayelen consists of a three-element polary beam monated on top of a 40 ft.
arrays. This leads has a close-spaced director and a wide-spaced prefector. This spacing has been
periment. The forcilize of the antenna is 90 close
to 50.00 Mc and 10.00 mc and 10.00 mc and 10.00 mc and 10.00 mc
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144 Mc. DIGEST by W. J. Hartley

144 Me. DOGET by W. J. Hurthy
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physical venders conditions presided for the
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two for a party consider of a AAG and IIII; two
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Added interest to the day was the advent of the Geelong boys in SAKE, SBH, 3VF and 3BW, while the townites were 3AJ, 3ACM, 3LH, 3EW, 3EM, 3ES, 3BK, 3TO, 3JO, 3LS, 3BQ, 3LX and 3ADC. The last three calls being newcomers to the hand.

The base three cash being reconsors to the hand, we seem to be seen to the seem of the see

At present there are several country groups working away without any outside help and it would

be quite fitting as a reward for their interest if the above was brought about.

above was, brought about.

Debring the past month 3VA ex-164, made the past improvement is noticed in the horizont past improvement is noticed in the horizont past and the past improvement in the horizont past a 2ABA beauty beauties. 2020, if Millard, is 3ABA will follow and, 270 is back on again with 2ABA will follow and, 270 is back on again with a 2ABA will follow and, 270, 310 and 38BV, will come be heart; 2AVA, 370, 310 and 38BV, will come be heart; 2AVA, 370, 310 and 38BV, will come be heart; 2AVA, 370, 310 and 38BV, will come be heart; 3AVA, 370, 310 and 38BV, will come be heart; 3AVA, 370, 310 and 38BV, will come be heart; 3AVA, 370, 370 and 38BV, will come be heart; 3AVA, 370, 370 and 38BV, will come be heart; 3AVA, 370, 370 and 38BV, an

SUL, JAKE and JAFF are all or with the 287 cm, all are taged of chosen beams on the following court all are using a closural beams on the following court all are using a CVO. Introcessor and the court of the court SAKE and SAJP are all on with the 522

To date there is no progress results to hand from N.S.W. as to the three months VHF three-band Contest, the only news is that bolk 2NO and 2RF are having contacts over a half-mile distance on 576 Mc., equipment in use are mod. occ. using the Lighthouse tubes and sopre regen. receivers.

Authority on 11 to 10 to 11 to 13 high law i have been VKK with about 13 stations on the 10 h. A very interesting 63 Me. Bold day was beit eith proceeding 65 Me. Bold day was beit eith proceeding 65 Me. Bold day was beit eith proceeding 65 Me. Bold day was beit for the 10 Mental Ford 10 Men

Done of 7AB, the lone VHF worker on 144 Me.1 The nearest is the Launceston 144 Mc. network 100 miles away. At present he has to build a new consyster, then things will come 30f's way. The Launceston gang are using super regens, and S.E. Osr, or M.O.P.A.S.

The Mount Gambier boys are still on the look-out and it would indeed be a help if the N.W. and S.W. Zones could play ball with them.

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FOR SALE.—Brand new, unused RCA 803, 125 watt diss. pentode, ceramic base suppressor conn. VK3BG, 25 Panoramic Road, North Balwyn.

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FOR SALE.—Home-built Ham Receiver—6K7 R.F., 6L7 Mixer, 6K7 H.F. Osc., 6K7 I.F., 6N7 and 6F6 output; two sets of three plug-in coils; separate R.F. section for 56 Mc. band using R.F. Mixer and H.F. Osc. stages. Eddystone components used throughout including special 3 stage wide-band I.F. unit at 2.000 Kc. Complete under-chassis components, provision for speaker in front panel, constructed in aluminium case approx. 21" x 21" x 12" deep; built-in power supply using 83 rect.; £10 or

FOR SALE.—56 Mc. Crystal Control-led Transmitter, see "A.R." Nov. 1938, for complete details. Tube line-up 42 C.O., 6V6 Quadrupler, 6L6 Doubler, 807 P.A. Constructed on "Masonite" chassis and panel. Useful components include Eddystone condensers and dials Isolantite sockets, feed-thru and stand-off insulators, by-pass condensers, resistors, coils, etc., 0-100 Ma. meter, with genuine Radiotron 807: no other tubes or

crystals; £2/10/- or offer. FOR SALE. — 56 Mc. Resistance-FOR SALE.—56 Mc. Resistance-coupled Superhet. Receiver, tube line-up 57 Mixer and Osc., 58 1st IF, 58 2nd IF, 56 2nd Det, with tubes and all other components, £1/10/- or offer Write to H. N. Stevens, VK3JO, 33 Auburn Grove, Hawthorn East, E.3, Melhourne

FOR SALE .- Transceivers: 108 Mk. 2 108 Mk. 3, £8 each. Type A Mk. 3 with power pack, spares and carrying cases, new, £10 each. FS6, complete with power unit, £10. TR1196, 9 tubes and genemotor, £9. All are complete with tubes, mike, phones, aerial and power units. No batteries with 108s which have been used. Transmitter: S53, a 250 watt job in steel cabinet with racks containjob in steel cabinet with racks containing power supply (with low input switch), modulator, 14 sockets, exciter and amplifier, no tubes, £20. Power Unit: Type S for ATS-AR8, two new B68A tubes, £15. Microphone: Dynamike, new, £6/10/-. Headphones, single rern, S.T.C. LR, 12/8 doz. Owing to change of Quarters I am cramped for room, hence sale. E. Kerby, VK3KK, 85 Auburn Road, Auburn, E.2, Victoria.

FOR SALE .- Two valves 809 new. 25/- each. One type 522 Transmitter VHF 100-150 Mc., complete less power supply.—VK3MN FU 3137.

FOR SALE.—Type A Mk. III, complete with spares, plus 13 QST, 14 Radio News, 2 Radio Craft, 3 Radio World. R. H. Hovey, 20 Sixth St., Parkdale, S.11, Victoria

WANTED.-FS6 Transceivers complete or parts. Also want 100 Kc. Crystal. Prices and particulars to J. McLennan, 20 Ferry St., Ewardstown, Ade-



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The transformers listed in this section have been designed specifically for use by manufacturers in standard types of radio receiver sets; but they may, of course, be applied to any electrical apparatus for which their specifications make them suitable. Coil temperature rise with continuous operation will not exceed 30-35 degrees Centigrade over ambient.

These units are constructed to permit sub-panel wiring, and are fitted with drawn steel covers finished in smooth All these units are baked and impregnated with super insulating varnish and are specifically made for use under

Type No. 4212 Item 6.

The state of the s			
Prim: 240v 35vA H.T.: 210 CT 210v		H.T.: 385 CT 385v Fils: Base: 4 x 3½ x 2½" H Mntg: H10	50vA 50 cps 80 mA 5v-2A 6.3v-3A Wgt 4lb 12oz "S" is 1\frac{1}{4}"
Item 2.	Type No. 4282		Type No. 8302
Prim: 240v 37vA H.T.: 280 CT 280v Fils: Base: 3# x 2# x 1#" H Mntg: H14		H.T.: 300 CT 300v Fils: Base: 4 x 3½ x 1¾" H Mntg: H10	54vA 50 cps 80 mA 5v-2A 6.3v-3A
		Item 8.	Type No. 10382
Prim: 200-230-240v	5v-2A 6.3v-2A Wat 3lb 12oz	Prim: 200-230-240v 6 H.T.: 385 CT 385v 5 Fils: 8 Base 4 x 3½ x 2½" H 6 Mntg: H10	52vA 50 cps 100 mA
Mntg: H14	"S" is 12"	Item 9.	Type No. 10302
Prim: 200-230-240v 40vA H.T.: 290 CT 290v	5v-2A 6 3v-2A	H.T.: 300 CT 300v Fils: Base: 4 x 3½ x 2" H Mntg: H10	52vA50 cps 100 mA 5v-2A 6.3v-3A Wgt 4lb 10oz "S" is 1\frac{1}{4}"
Base: 3½ x 2½ x 1½" H		Prim: 200-230-240v 8	Type No. 13282
Prim: 200-230-240v 60vA H.T.: 385 CT 385v Fils: Bose: 4 x 3\frac{3}{2} x 2\frac{3}{2} H Mntg: H10	. 5v-2A 6.3v-3A 2.5v-5A Wat 4lb 14oz	Fils: Base: 4 x 3½ x 4½" H Mntg: H10 D.C. Volts Cho 5V4 5Z3	

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